University of Bahrain
College of Information Technology
Department of Computer Science
Semester I, 2012-2013
CSC 103 (Computer Programming for Scientists and Engineers)

Mid-Term Exam

Date: 7th November 2012 **Time: 11:00-12:30**

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SECTION #	02
SERIAL #	17

NOTE: THERE ARE SEVEN (8) PAGES IN THIS TEST
WRITE ONLY ONE SOLUTION FOR EACH QUESTION

Question #	MARKS		COMMENTS
1	10	10	
2	15	10	
3	10	8	
4	15	15	
5	10	8	
6	15	11.5	
TOTAL	75	62.5	

Question 1 (10 Marks)

Show your work in each of the following parts

(i) [6 Marks] Convert the following numbers from/to indicated bases:

a. $(101011)_2 = (43)_{10}$

32 16 8 4 2 1

32 + 8 + 2 + 1

b. $(7074)_8 = (E3C)_{16}$

$(111\ 000\ 111\ 100)_2$

E 3 C

c. $(190)_{10} = (276)_8$

8 | 190 6
8 | 23 7
8 | 2 2
| 0

(ii) [4 Marks] Perform the following arithmetic operations:

a. The binary sum of 101011 and 11101

```
 111111
 101011
  11101
-------
1001000
```

b. The binary multiplication (product) of 11011 and 1101

```
        11011
         1101
    ---------
        11011
       00000
      11011
     11011
    ---------
    101011111
```

Question 2 (15 Marks)

What is the output of the following codes?

(1) **4 Marks**

```
char z='$';
double x=756.389;
int y=564;
cout<<fixed<<showpoint<<setprecision(5);
cout<<left;
 cout<<setfill('*');
cout<<setw(10)<<y<<endl;
cout<<setw(10)<<x<<endl;
cout<<right;
cout<<setw(10)<<z<<endl;
cout<<setw(10)<<2.56*1.5;
```

(2) **3 Marks**

```
int x = 5 ;
int y = 3, z;
x = 10  +  --y ;
z = x % 5 / 6 + y;
cout <<"X="<<x<<"\t"<<"Y="<<y<<"\t"<<"Z="<<z;
```

(3) **3 Marks**

Suppose the user input is: 20

```
int num;
cin >> num;
switch ( num)
{
case 10: num = -10;
         break;
case 20:
case 25: num = 4;
         break;
case 40: num = 20;
         break;
default: num = 30;
}
cout << num;
```

(4) **5 Marks**

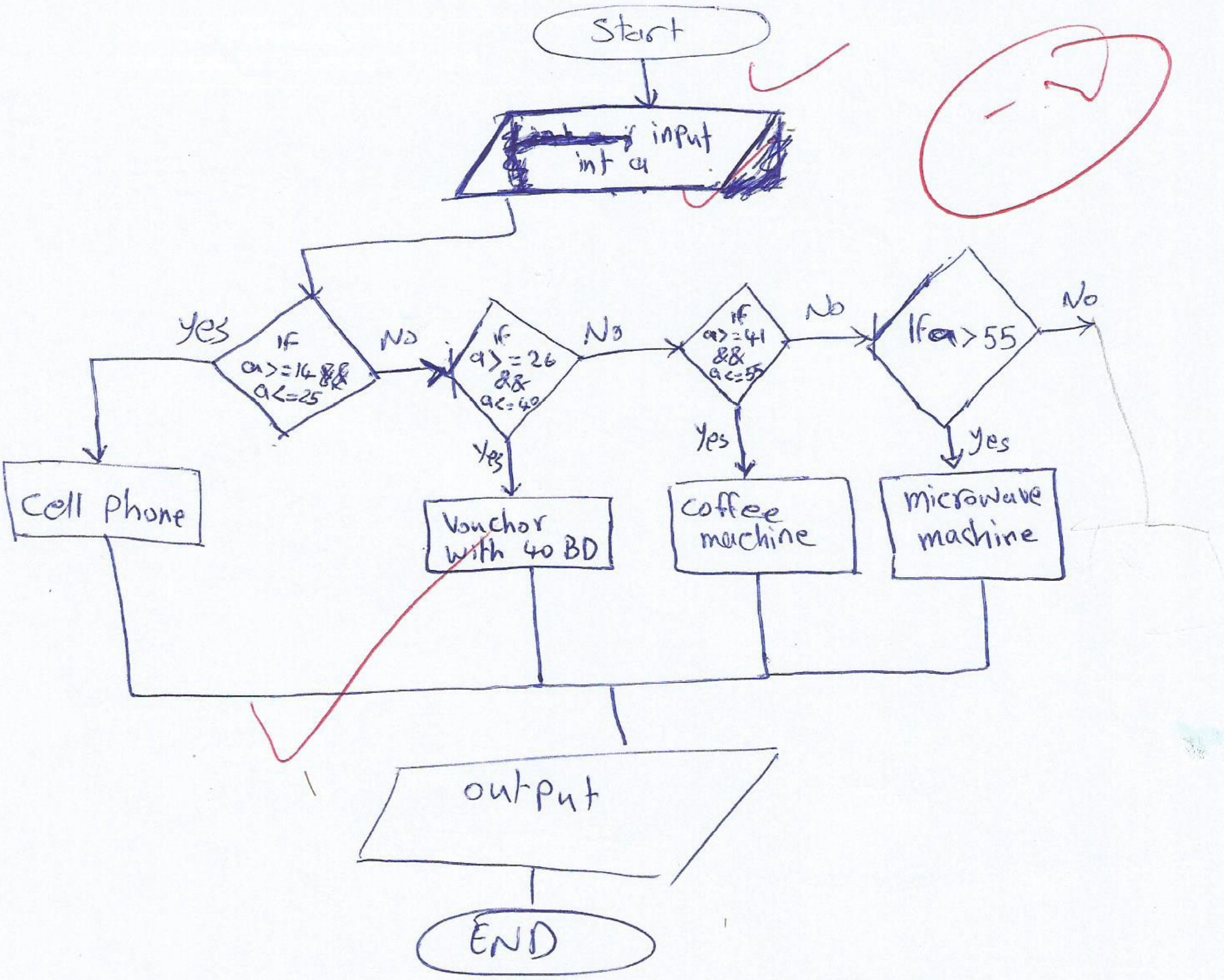
```
int k = 1,a = 10;
while ( k <= 5)
  {
   if (k / 3 == 2)
       a *= 2;
   if (a % 2 == 0)
      a+=2;
   else
      a+=1;

  cout << a << endl;
  ++k;
  }
```

Question 3 (10 Marks)

ABC department store offers a prize if the person's purchases **exceed** *150 dinars*. The prize will be given based on **age range.** Draw a **flowchart** that read a purchase and age. The program should display the corresponding prize based on age range according to the table below.

Age	Prize received
Between 14 and 25	Cell phone
Between 26 and 40	Voucher with 40 BD
Between 41 and 55	Coffee machine
55 and above	Microwave machine



Question 4 (15 Marks)

Write a C++ program that calculates and displays the ideal weight based on the user's age and height. The formula is as follows.

Note that the weight given by the formula is in kilograms.

AGE GROUP	IDEAL WEIGHT FORMULA
persons up to and including age 18	(height - 36) / 2
persons between age 19 years and 55 inclusive	((height - 36) / 2) + ((age - 18) / 7)
persons between 56 years and 75 inclusive	((height - 36) / 2) + ((37 / 7) - ((age - 55) / 4))
persons over the age of 76 years	same as for those of 18 years or younger

Sample Input/Output

```
Enter your height and age:  175  35
Ideal weight for that person = 71.9286
```

```
#include <iostream>
#include <cmath>

using namespace std;
int main ()
{
 int a;
 bouble w, h;
Cout<<"Enter your height and age"
Cin >> a>>w;

   Switch IF (a <= 18)
    {      h = (w-36)/2
     Cout<< ... 
     Cout<<"Ideal weight for the Person"<<(w-36)/2;
    else IF (a>=19 && a<=55)
     Cout<<"Ideal weight for the Person"<<(w-36)+((a-18)/7
        h=(w-36)/2 + ((a-18)/7)
  else IF (a>= 56&& a<= 75)
       h = ((w-36)/2) + ((37/7)-((a-55)/4))
  else
       h = (w-36)/2
  }
 Cout<<"Ideal weight for that person ="<<h;
```

Question 5 (10 Marks)

Consider a file named "**student.txt**" which contains the name of the student and his/her student ID number. Write a C++ program that reads the student name, and ID number from the file. The program should then display on the screen the student's name followed by his/her academic year.

student.txt

Ahmed 2011433

The Output: Ahmed 2011

```
#include <iostream>
#include <fstream>
#include <string>
using namespace std;
int main ()
{
string name ;
int ID ;

ifstream inFile;
infile.open ("student.txt");

Cin >> name >> ID ;

ID = ID/1000

Cout << name << \t << ID ;

return 0
}
```

-8

2

1

1

1

1.5

1

0

Question 6 (15 Marks)

Write a C++ program that asks the user to enter 10 integer numbers. The program then displays the following:

1. Number of even numbers.
2. The average of odd numbers.

Sample Input/Output

```
Enter the numbers: 2   6   13   4   9   7   12   3   8   20

Number of even numbers = 6
The average of odd numbers = 8.0
```

11.5

```
#includ <iostream>

using namespace std;
int main()
{

int x, count1=0, num1=0, count2=0 ;
double avg,

cout <<"Enter the numbers" ;

    While (x)            count = 10)
    { cin>>x;
        if (x%2 == 0)
        {
            ++count1 ;
        }
        elsa if(x%2 != 0)
        {
            num+=x ;
            ++count2;
        }
    }

cout <<"Number of even number="<< count1 ;
cout <<"The average of odd numbers="<< num/count2 ;
return 0
```

count=0; −1

−1.5

−1

count++;